

1                    METHOD AND APPARATUS FOR ACCESSING ELECTRONIC  
2                    DATA VIA A FAMILIAR PRINTED MEDIUM

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4           FIELD OF THE INVENTION

5           The present invention relates generally to the electronic  
6 media industry -- such as cable television (CATV), home shopping  
7 services, on-line computer services, personal computer  
8 applications, and CD-ROM-based multi-media applications -- and,  
9 more particularly, to a method and apparatus for allowing a user  
10 to access and make use of such electronic media services via a  
11 device that makes use of a standard book, magazine or other  
12 printed work.

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14           BACKGROUND OF THE INVENTION

15           It is a well-known fact that a large fraction of the  
16 population is unfamiliar with the operation or use of modern  
17 computer devices. This remains true despite significant advances  
18 in user-interface technology -- such as mouses, windows, menus  
19 and the like. It is commonly said that such technology makes  
20 computers "user friendly." However, the modern  
21 mouse/window/menu-based user-interface technology has been widely  
22 available for several years, and yet it still appears that this  
23 technology is not a panacea for computer-phobia. Indeed, studies  
24 have shown that a majority of VCR owners cannot operate the  
25 simple menu-based interface used to program their VCRs. Thus,

1 there exists a great need for improved user-interface technology,  
2 if computer-based electronic media is to become as widely used  
3 and accepted as television or radio.

4 This need for improved user-interface technology will become  
5 even greater with the arrival of technology such as the presently  
6 planned "information superhighway," which will permit delivery of  
7 high-bandwidth (i.e., full-motion video rate) digital data into  
8 millions of homes via fiber optic, cable, RF, microwave or  
9 satellite links. Such technology will, in concept, permit  
10 instant delivery of a virtually limitless selection of  
11 commercial, informational, educational and entertainment  
12 programming at a user's request. However, without better user-  
13 interface technology, the average user may not be capable of  
14 enjoying the vast capabilities of such a system. Indeed, it is  
15 clear that the number of programming choices available to the  
16 user of such technology will be far greater than the number of  
17 choices involved in programming a VCR -- a task already  
18 demonstrated to be too complicated for the average user of  
19 present-day user-interface technology.

20 In contrast to the difficulty many people encounter in using  
21 remote controls and other prior art computer interfaces, printed  
22 matter -- such as books and magazines -- represents an almost  
23 universally familiar and non-intimidating medium by which a user  
24 can acquire desired information. Even illiterate individuals  
25 incapable of reading text can nonetheless peruse pages of printed

1 matter and appreciate the substance of flashy advertisements and  
2 the like. Thus, it would be highly desirable to provide a system  
3 with the information accessing capabilities of a modern CD-ROM or  
4 on-line computer system, and the user-interface simplicity of  
5 printed matter.

6 The prior art includes a class of devices known as "talking  
7 books" -- see, e.g., U.S. Patent Nos. 4,636,881 entitled TALKING  
8 BOOK WITH AN INFRARED DETECTOR USED TO DETECT PAGE TURNING,  
9 4,702,573 entitled VISUAL AND AUDIBLE ACTIVATED WORK AND METHOD  
10 OF FORMING SAME, 4,778,391 entitled SOUND-PRODUCING AMUSEMENT OR  
11 EDUCATIONAL DEVICES, 4,809,246 entitled SOUND ILLUSTRATED BOOK  
12 HAVING PAGE INDICATOR CIRCUIT, 4,990,092 entitled TALKING BOOK  
13 and 5,209,665 entitled INTERACTIVE AUDIO VISUAL WORK, all of  
14 which are incorporated herein by reference. Typically, these  
15 "talking books" consist of a book with various sensors which --  
16 when activated by touching, page turning, etc. -- cause a sound  
17 generating means (also embedded within the book) to produce or  
18 replay particular sounds. Talking books thus provide an  
19 interface for allowing an unsophisticated user (i.e., a child) to  
20 access a very primitive computer (i.e., the sound generating  
21 means embedded within the book) via familiar printed matter  
22 (i.e., the book with embedded sensors). Importantly, however,  
23 talking books do not provide a means for interfacing with modern  
24 electronic media -- such as cable television (CATV), home  
25 shopping services, on-line computer services, CD-ROM-based multi-

1 media applications, interactive TV or home computer applications.

2 One approach to interfacing with these modern electronic  
3 media is the "simulated book" -- see, e.g., U.S. Patent No.  
4 4,855,725, entitled MICROPROCESSOR BASED SIMULATED BOOK,  
5 incorporated herein by reference. The "simulated book" is in  
6 essence a book-size intelligent graphics terminal. Unlike the  
7 talking books, the simulated book is not a self-contained system,  
8 but rather transmits commands to and receives data from a CD-ROM  
9 equipped personal computer via a wireless link. Thus, the  
10 programming that the simulated book can access is not limited to  
11 that which can be stored in embedded memory devices, as with the  
12 talking books. Importantly, however, the user-interface provided  
13 by the simulated book is essentially the conventional computer  
14 interface -- i.e., keys, pointer, menus, etc. Therefore, a  
15 computer-phobic user will likely still find the simulated book  
16 intimidating and inaccessible.

17 A disadvantage of both the talking book and simulated book  
18 technologies is that both include relatively costly electronics -  
19 - i.e., microprocessors, memory, display devices, etc. -- as a  
20 part of the "book." Thus, these technologies cannot be  
21 effectively used to create a "throw-away" interactive magazine,  
22 newspaper or advertising brochure.

23 Thus, there remains a need for a method and apparatus for  
24 accessing the vast resources of electronic media using a device  
25 as familiar and non-intimidating as printed matter. There

1 remains a further need for such a method and apparatus which  
2 utilizes a low cost, throw-away printed matter.

#### 3 4 SUMMARY OF THE INVENTION

5 One object of the present invention is a method and  
6 apparatus for allowing a user to access electronic media via a  
7 printed matter.

8 Another object of the invention is a method and apparatus  
9 for allowing a user to access electronic media relating to, or  
10 expanding upon, material presented in the printed matter.

11 Another object of the invention is a low cost, throw-away  
12 printed matter useful in connection with other objects of the  
13 invention.

14 Still another object of the invention is an improved method  
15 of providing electronic media services.

16 Yet another object of the invention is an intelligent  
17 controller for use in connection with the invention.

18 In accordance with one embodiment, the invention comprises:  
19 (i) a printed matter having at least one sensor and a transmitter  
20 associated therewith; and (ii) an intelligent controller having a  
21 receiver and a means for accessing programming material. A user  
22 triggers said sensor through interaction with said printed  
23 matter, for example, by touching a particular spot on a page or  
24 by turning a page. In response to the triggering of said sensor,  
25 the transmitter sends a signal indicative of said sensor. The

1 receiver receives said signal and, in response thereto, the  
2 intelligent controller executes a pre-programmed command related  
3 to accessing or controlling electronic media or programming. For  
4 example, when the user triggers a sensor associated with an  
5 advertisement in the printed matter, the intelligent controller  
6 may, in response, send a signal via a telephone line, cable  
7 connection, or wireless modem or cellular link to a remote video  
8 server, and thereby cause a promotional program to appear on the  
9 user's television.

10 In accordance with another embodiment, the invention  
11 comprises: (i) a printed matter having at least one machine-  
12 recognizable feature -- such as a bar code or magnetic strip (or  
13 any commonly used printed indicia, such as a printed character,  
14 symbol or pictorial icon), (ii) a feature recognition unit having  
15 a means for recognizing said feature and a transmitter, and (iii)  
16 an intelligent controller having a receiver. The user directs  
17 the feature recognition unit to a feature on said printed matter.  
18 In response, said recognition unit transmits a signal indicative  
19 of the identity of the particular feature. The receiver receives  
20 said signal and the intelligent controller, in response thereto,  
21 executes an appropriate pre-programmed command.

22 In accordance with another embodiment, the invention  
23 comprises: (i) a printed matter having at least one machine-  
24 recognizable feature and (ii) an intelligent feature recognition  
25 unit having means for recognizing said feature, means for

1 associating said recognized feature with a command, and means for  
2 issuing said command over a wireless link. In use, the user  
3 directs said intelligent feature recognition unit at a feature on  
4 said printed matter. In response, said intelligent recognition  
5 unit associates said feature with a pre-programmed command and  
6 issues a pre-programmed command sequence over a wireless data  
7 link to control or access electronic media services. The command  
8 may, for example, be transmitted -- via an infrared (IR) or  
9 ultrasound link -- to a CATV control box in the same room, or --  
10 via a cellular or satellite link -- to the CATV company office.

11 In accordance with another embodiment, the invention  
12 comprises a printed matter having: (i) at least one sensor, (ii)  
13 a control module and (iii) a transmitter associated therewith.  
14 In response to the triggering of said sensor, said control module  
15 directs the transmitter to transmit a command related to  
16 accessing or controlling an electronic media service.

17 Other aspects of the invention relate to methods of  
18 providing, accessing or utilizing electronic media services. In  
19 accordance with one such aspect, the invention involves: (i)  
20 providing a printed matter having at least one sensor associated  
21 therewith, (ii) providing an intelligent controller which, in  
22 response to the triggering of said sensor, performs a pre-  
23 programmed command, and (iii) executing said pre-programmed  
24 command to access or control an electronic media.

25 Another aspect of the invention involves a method of

1 providing electronic media services, which includes the steps of:  
2 (i) providing printed matter to a potential customer and (ii)  
3 pre-programming an intelligent controller to access or control an  
4 electronic media service in response to an event wherein the  
5 customer interacts with the printed matter in a particular  
6 manner. Advantageously, said printed matter comprises a low  
7 cost, throw-away publication.

8 In accordance with another aspect of the invention, an  
9 improved method of providing shop-at-home services includes the  
10 steps of: (i) providing to the customer a printed catalogue  
11 having at least one sensor or machine-recognizable feature  
12 associated therewith, (ii) programming a controller to execute a  
13 pre-programmed command in response to an event wherein the  
14 customer interacts with said sensor or feature, and (iii)  
15 providing a service -- e.g., displaying promotional programming  
16 on the customer's television, contacting the customer by  
17 telephone, establishing a computer "chat" link, etc. -- by  
18 telephone, cable, or wireless link in response to the execution  
19 of said command.

20 Another aspect of the present invention relates to an  
21 improved method of instruction, including the steps of: (i)  
22 providing an instructional printed matter -- such as a textbook,  
23 cookbook, children's book or manual -- having at least one sensor  
24 or machine-recognizable feature associated therewith, (ii)  
25 providing a means, distinct from said textbook or other printed



1 matter, for executing a pre-programmed command in response to an  
2 event wherein a reader interacts with said sensor or feature, and  
3 (iii) in response to said command, causing or controlling: (a)  
4 the electronic delivery or presentation of information related to  
5 that in the textbook or other printed matter; and/or (b) the  
6 establishment of a communication link to a live tutor or  
7 consultant familiar with the subject matter contained in the  
8 instructional printed matter.

9 Another aspect of the invention relates to a low cost,  
10 throw-away printed matter -- including at least one machine-  
11 recognizable feature -- adapted for use in connection with the  
12 invention.

#### 13 BRIEF DESCRIPTION OF THE DRAWINGS

14 The above -- as well as other -- aspects, objects and  
15 features of the present invention will be described in the  
16 Detailed Description below, which is intended to be read in  
17 conjunction with the following set of drawings, in which:  
18

19 Fig. 1 depicts an embodiment wherein the display unit  
20 is embedded within the printed matter;

21 Fig. 2 depicts an embodiment of the invention wherein  
22 electronic media is presented on a user's TV set;

23 Fig. 3 depicts an embodiment of the invention wherein  
24 programming material is accessed from a remote  
25 source;

1 Fig. 4 depicts an embodiment of the invention which  
2 includes a feature recognition unit;

3 Fig. 4a depicts an embodiment of the invention wherein  
4 the feature recognition unit provides an interface  
5 between the display unit and a remote source of  
6 programming material;

7 Fig. 5 depicts an embodiment of the invention adapted  
8 for presentation of musical programming;

9 Fig. 5a depicts an alternative embodiment of the  
10 invention adapted for presentation of musical  
11 programming;

12 Fig. 6 depicts an embodiment of the invention wherein  
13 the display unit comprises a personal computer;

14 Fig. 6a depicts an embodiment of the invention wherein  
15 the user employs a hand-held scanner/pointer  
16 device to select features associated with a  
17 printed matter and to interface with an  
18 intelligent controller or personal computer; and

19 Fig. 7 depicts an embodiment of the invention adapted  
20 for shop-at-home applications.

21  
22 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

23 In this section, the various preferred embodiments of the  
24 invention are described from two general perspectives. The  
25 first, a "functional" perspective, focuses on the contemplated

1 interactions between the user and the various components -- i.e.,  
2 the printed matter, controller, display unit, etc. -- of the  
3 invention. This functional description provides the insight  
4 needed to implement the software or firmware used in connection  
5 with the invention. The second perspective, the "apparatus"  
6 view, describes the various technologies that can be used to  
7 implement the individual components of the present invention.

#### 8 9 THE FUNCTIONAL PERSPECTIVE

10 Reference is now made to Fig. 1, which depicts an  
11 embodiment of the invention comprising a printed matter 1 in  
12 communication (preferably wireless) with a data server 2.  
13 Printed matter 1 includes at least one sensor 3 and a controller,  
14 which preferably includes a microprocessor 4. A stiff or flexible  
15 page 5 (any page within a book) holds a display screen 6.

16 Printed matter 1 can take the form of a book, magazine,  
17 manual, musical score, catalog, advertisement, newspaper,  
18 telephone or electronic service directory, or other like means.  
19 The controller -- including microprocessor 4 -- is preferably  
20 embedded within the spine or any other page of printed matter 1.

21 Display screen 6 can be an LED display, a passive or active  
22 matrix LCD display or other like means, and may also have an  
23 audio transducer associated therewith.

24 Sensor 3 is preferably touch sensitive, but can also be a  
25 page sensor or a combination of touch and page sensor, as

1 described below. In response to a user's touch, microprocessor 4  
2 causes programming material to be retrieved from data server 2  
3 and displayed on screen 6. Data communication between server 2  
4 and microprocessor 4 may operate via RF cellular, microwave, IR,  
5 optical, conductive, telephonic or CATV links, or any combination  
6 of these or other like means.

7 Reference is now made to Fig. 2, which depicts an  
8 alternative embodiment of the invention comprising a printed  
9 matter 21, an intelligent controller 24 and display unit 25.  
10 Printed matter 21 includes at least one sensor 22 and a  
11 transmitter 23. In response to a user's actuation of sensor 22,  
12 transmitter 23 transmits a coded signal indicative of the  
13 identity of the actuated sensor. A receiver 26 in intelligent  
14 controller 24 receives the coded signal. Controller 24 then  
15 identifies the actuated sensor, and initiates display of  
16 appropriate programming material on display unit 25 (which can be  
17 a TV set or any other means for audio or audiovisual  
18 presentation, including but not limited to a personal computer).  
19 Programming material preferably derives from a mass storage  
20 device -- e.g., a magnetic disk, CD-ROM, ROM, flash RAM, PCMCIA  
21 card or other memory means -- associated with intelligent  
22 controller 24 (or with display unit 25). As used herein, the  
23 term "memory means" shall also include future storage  
24 technologies, such as the recently announced multi-layer CD-ROMs  
25 being developed by IBM. See "New I.B.M. Laser Method Stacks Data

on Disks," New York Times, May 13, 1994.

Reference is now made to Fig. 3, which depicts an embodiment of the invention in which intelligent controller 31 derives programming material from a remote server 30. Controller 31 includes means for accessing a remote server 30 of programming material, and preferably further includes means for decompressing compressed programming material received from server 30. In response to a coded signal received by receiver 26, intelligent controller 31 sends an appropriate command to server 30 to select and initiate transfer of appropriate programming material. Controller 31 then receives programming material from remote server 30 and prepares (e.g., decompresses, if necessary) the material for presentation on display unit 25. As with conventional pay-per-view CATV services and on-line computer services, the user is billed according to the volume and/or nature of programming material requested.

Reference is now made to Fig. 4, which depicts an embodiment of the invention including a printed matter 40, a feature recognition unit 42, an intelligent controller 31, a server 30 and a display unit 25. Printed matter 40 includes at least one machine-recognizable feature 41 in the printed work, such as a bar code, invisible bar code, magnetic code, printed character, symbol or pictorial icon, or other feature.

Feature recognition unit 42 is a hand-held device and includes means 44 for recognizing feature 41, a transmitter 45

1 and an optional user actuation switch 43. The user directs  
2 recognition unit 42 at a feature and depresses actuation switch  
3 43. In response thereto, means 44 for recognizing "reads" (i.e.,  
4 for a printed feature, scans and identifies) the feature 41, and  
5 transmitter 45 transmits a coded signal indicative of the  
6 identity of feature 41. The operation of controller 31, server  
7 30 and display unit 25 is otherwise identical or similar to the  
8 Fig. 3 embodiment.

9 Still referring to Fig. 4, use of embedded features 41 -- as  
10 opposed to sensors -- lowers the fabrication cost of printed  
11 matter 40. Advantageously, printed matter 40 can be a low cost,  
12 throw-away publication.

13 An identification code generated either by recognition unit  
14 42 or intelligent controller 31 allows the user to be billed for  
15 his/her use of transmitted material by server 30 and, for  
16 commercial applications, allows the advertiser to identify the  
17 potential customer.

18 Reference is now made to Fig. 4a, which depicts an  
19 embodiment of the invention in which the functions of the  
20 intelligent controller are integrated into a recognition/control  
21 unit 46. Unit 46 includes means 44 for recognizing feature 41  
22 and means 48 for accessing -- preferably via a cellular RF link -  
23 - programming material associated with server 30. In addition,  
24 recognition/control unit 46 optionally includes a microprocessor.  
25 Either recognition/control unit 46 or display unit 47 may include

1 means for decompressing compressed programming material.

2 Reference is now made to Fig. 5, which depicts an embodiment  
3 of the invention adapted for musical applications. The  
4 embodiment includes a printed musical score 50, an electronic  
5 baton 51, a music controller 55 and an audio/audiovisual player  
6 56. Using baton 51, the user directs a recognition means 52 --  
7 which can be either a CCD camera or a magnetic detector -- at a  
8 particular portion 57 of printed score 50. Transmitter 53 then  
9 transmits a coded signal indicative of the selected portion 57.  
10 Music controller 55, in response to the coded signal, directs the  
11 presentation of appropriate audio or audiovisual programming on  
12 player 56. Music controller 55 may include a means for storing  
13 programming material -- such as ROM, CD-ROM, flash RAM, PCMCIA  
14 card or other memory means -- or an electronic musical  
15 synthesizer, or both.

16 Reference is now made to Fig. 5a, which depicts an  
17 alternative embodiment of the invention directed to musical  
18 applications. In Fig. 5a, music controller 55a retrieves  
19 programming material from a remote data server 57. Using a  
20 remote server permits continuous updating of programming  
21 material, such as replacing one performance or opera company with  
22 another. Either player 56 or controller 55a preferably includes  
23 means for decompressing compressed programming material received  
24 from server 57.

25 Reference is now made to Fig. 6, which depicts an embodiment

1 of the invention utilizing a personal computer to access and  
2 display electronic programming material. In this embodiment,  
3 portions of the personal computer provide the functions of the  
4 previously-described intelligent controller, while other portions  
5 of the computer provide the functions of the display unit. An  
6 interface unit 60 includes a receiver 26 for receiving a coded  
7 signal, from a transmitter 23, representative of an actuated  
8 sensor 22 (or, in an alternative embodiment which includes a  
9 feature recognition unit, from the feature recognition unit  
10 indicative of the selected feature) on printed matter 21.  
11 Interface unit 60 connects to personal computer 61 by any  
12 conventional means, such as an I/O port, card slot, etc.  
13 Personal computer 61 monitors the interface unit 60, and displays  
14 (or controls the display of) appropriate programming material  
15 selected by the user through his/her interaction with printed  
16 matter 21.

17 Programming material can be stored on personal computer 61 -  
18 - on a ROM, CD-ROM, flash RAM, PCMCIA card, or other disk/card  
19 supplied along with printed matter 21 -- or accessed from a  
20 remote data server 62.

21 Reference is now made to Fig. 6a, which shows an embodiment  
22 of the invention wherein a user employs a hand-held scanner/mouse  
23 device 67 to: (i) select programming material associated with a  
24 feature 41 on a printed matter 40; and (ii) control or interact  
25 with a personal computer 65 during the presentation and/or



1 execution of the programming material. An exemplary  
2 scanner/mouse 67 is described in detail in U.S. Patent No.  
3 4,804,949, entitled HAND-HELD OPTICAL SCANNER AND COMPUTER MOUSE,  
4 which is incorporated herein by reference. The Fig. 6a  
5 embodiment provides at least two modes of interaction:

6 (i) Scan Mode:

7 In this mode, scanner/mouse 67 operates as a  
8 scanner. The user points scanner/mouse 67 at a  
9 feature 41 in a printed matter 40 and depresses a  
10 switch to cause the feature to be scanned.  
11 Personal computer 65 receives the scanned image,  
12 decodes it, and executes a pre-programmed command  
13 in response. Execution of the pre-programmed  
14 command may, for example, cause personal computer  
15 65 to fetch an interactive software program from a  
16 centralized data bank 62, and begin execution of  
17 the fetched software. Once the fetched software  
18 begins executing, scanner/mouse 67 may be placed  
19 into mouse/trackball mode, in order to support  
20 interaction between the user and personal computer  
21 65.

22 (ii) Mouse/Trackball Mode:

23 In this mode, scanner/mouse 67 operates as a  
24 normal X-Y movement sensor, such as a mouse or  
25 trackball. Thus, this mode is useful to control

1 conventional graphical interface functions, such  
2 as menus, windows, icons, cursers, video games,  
3 etc. Those skilled in the art will appreciate  
4 that this mode can provide any or all features  
5 typically found in modern graphical user  
6 interfaces.

7 Reference is now made to Fig. 7, which depicts an embodiment  
8 of the invention adapted for commercial and shop-at-home  
9 applications. The customer views and interacts with a printed  
10 matter 70 (via sensors or a feature recognition units, both as  
11 previously described). Printed matter 70 is preferably a throw-  
12 away catalog or advertising brochure listing commercial items,  
13 such as programming choices, merchandise, travel or event  
14 schedules, or television and/or radio programming schedules. The  
15 user interacts with printed matter 70 (i.e., with certain  
16 features and/or sensors therein) to cause a coded signal 71  
17 indicative of the customer's selection to be transmitted (either  
18 by a transmitter embedded in the printed matter or within a  
19 feature recognition unit) to controller 73. In response thereto,  
20 controller 73 utilizes a modem/telephone (or other wired or  
21 wireless communication) link 74-75 to communicate the customer's  
22 selection to a commercial provider's remote office 78 (or to a  
23 centralized data bank or information superhighway).

24 The commercial provider preferably uses a "caller ID"  
25 function to identify the customer and can respond in a number of

ways: (i) have a representative contact the customer; (ii) send the ordered merchandise or tickets to the customer; (iii) direct a data server 72 to provide programming or additional promotional material via a CATV line 76 to controller 73, which replays the material on the customer's TV set; or (iv) download and execute an interactive merchandise selection program on the customer's personal computer or any other electronic media input, output or sensory stimulating device.

#### THE APPARATUS PERSPECTIVE:

The various technologies used to implement the individual functional components that comprise a part of this invention are described below.

#### TOUCH PAD TECHNOLOGY

Sensor 3 can be implemented using a wide variety of presently available touch sensitive pad technology. See, for example, U.S. Patent Nos. 5,016,008 entitled DEVICE FOR DETECTING THE POSITION OF A CONTROL MEMBER ON A TOUCH-SENSITIVE PAD, 5,012,124 entitled TOUCH SENSITIVE CONTROL PANEL, 4,862,151 entitled REMOTE CONTROL DEVICE FOR A COMPUTER ASSOCIATED WITH A VIDEO SCREEN, 4,827,084 entitled SOLID STATE IMAGE DETECTOR AND SIGNAL GENERATOR and 4,644,101 entitled PRESSURE-RESPONSIVE POSITION SENSOR, all of which are incorporated herein by reference.

1 Referring now to Fig. 2, a plurality of touch sensors 22 are  
2 embedded within the back binding of the printed matter 21.

3 Alternatively, touch sensors 22 can be positioned along inner or  
4 outer margins of the binding, or of particular pages, of printed  
5 matter 21 (or along an edge of a mounting tray in which a  
6 disposable printed matter is placed). Electronics mounted within  
7 printed matter 21 (or within a mounting tray) responds to the  
8 actuation of a touch sensor 22 and transmits a coded signal  
9 indicative of the identity of the actuated sensor.

10 Advantageously, touch sensors can be combined with page  
11 sensors -- as described in U.S. Patent Nos. 5,209,665; 4,990,092;  
12 4,636,881 and 4,809,246, all previously incorporated herein -- to  
13 provide a larger number of "effective sensors." In this  
14 embodiment, each time a sensor is actuated, the electronics  
15 within the printed matter also checks the page sensor(s) to  
16 determine which page is currently being viewed. The electronics  
17 then generates a coded signal that identifies both the sensor  
18 actuated and the currently visible page. Thus, each  
19 (page,sensor) combination represents, in essence, a single  
20 "effective sensor."

21 Hybrid embodiments combining touch pads and page sensors are  
22 also possible. For example, a printed matter might contain a  
23 sheet of touch sensors every so many pages, with the page  
24 interval being dependent on the stiffness of the pages and the  
25 responsiveness of the sensors. That is, if the maximum number of

1 pages through which a user's touch could be reliably detected by  
2 a touch sensor was X, then the printed matter would preferably  
3 include a sheet of touch sensors every X pages of text.  
4

#### 5 INTELLIGENT CONTROLLERS AND DATA/COMMUNICATION SERVERS

6 In accordance with several embodiments of the invention, an  
7 intelligent controller controls the selection of programming in a  
8 video "file server" system. File servers are well known in the  
9 art. Generally, as used herein, the term intelligent controller  
10 can refer to computer equipment having either: (a) some type of  
11 mass storage device, typically a magnetic or magneto-optical  
12 disk, that is connected to a network and utilized as central  
13 storage for multiple users via the network; and/or (b) some type  
14 of network interface which allows establishment of a  
15 communication link with other user(s).

16 Referring to a "file server" type of intelligent controller,  
17 the information that is typically stored on such a system  
18 consists of binary computer data such as executable programs and  
19 corresponding data. Exemplary of the types of corresponding data  
20 stored are numbers for spreadsheets, ASCII characters and codes  
21 for word processors, and drawing commands for drawing and CAD  
22 programs. These or similar types of data do not generally have a  
23 time element associated with them, nor do they generally require  
24 any extra processing beyond the usual interpretation that is  
25 accomplished by the computer program with which they are intended

1 to be used.

2 In contrast, the playback of audio/video information has a  
3 time element associated with its use. Furthermore, the amount of  
4 data required to store audio/video program information in "raw"  
5 digital form is often prohibitive. Thus, it is common to employ  
6 audio/video compression techniques to compress audio/video  
7 program information before it is stored. As a result, further  
8 processing in the form of decompression and digital-to-analog  
9 conversion is required before the real-time viewing of an  
10 audio/video program can take place. Decompression may be  
11 accomplished through the use of known hardware or software  
12 techniques. Digital-to-analog conversion may be required,  
13 depending on the type of equipment used for viewing the  
14 audio/video program. A known audio/video file server apparatus  
15 manufactured and marketed by Protocomm of Trevose, Pa. permits  
16 real-time playback of compressed audio/video program  
17 information.

18 Generally, modern audio/video file server systems include: a  
19 storage unit for centrally storing compressed digital audio/video  
20 program information, a transceiver for receiving compressed  
21 digital audio/video program information from an external source  
22 over a network (or wireless communication link) to update the  
23 stored audio/video program information, a plurality of playback  
24 units, each associated with an external playback line and an  
25 external playback station, each including a decompression unit,

1 for receiving selected compressed digital audio/video program  
2 information from the storage unit, for decompressing the selected  
3 compressed digital audio/video program information received from  
4 the storage unit, and for playing it in real time over the  
5 associated playback line to the associated playback station, a  
6 network interface unit for receiving playback requests from the  
7 playback units, and a processor for controlling the storage and  
8 playback units to play the decompressed selected audio/video  
9 program information in real time for viewing by users at selected  
10 playback stations.

11 Such a system is described, for example, in U.S. Patent No.  
12 5,262,875 entitled AUDIO/VIDEO FILE SERVER INCLUDING  
13 DECOMPRESSION/PLAYBACK MEANS, which is incorporated herein by  
14 reference. The '875 system can be adapted to operate in  
15 accordance with the present invention by coupling intelligent  
16 controller of the present invention with the '875 system's  
17 network interface unit (which provides the playback requests to  
18 the playback unit). In the '875 system:

19 "Playback may be initiated through a user  
20 request from one of the playback stations or  
21 through direct interaction with audio/video  
22 file server 5. In the latter case, a simple  
23 user interface, such as a menu interface,  
24 may be employed for selection of the desired  
25 program information and the playback  
26 station. For example, a menu of the available  
27 items of audio/video program information, as  
28 named by the user or by the system, may be  
29 presented. The user may make a selection  
30 through cursor control keys on a keyboard."  
31

1 In contrast, the present invention permits the user to select and  
2 control the presentation of audio/video programming through a  
3 familiar printed matter interface, as has been previously  
4 described. The present invention thus offers the advantage of  
5 nearly universal accessibility.

6 In accordance with the present invention, multimedia  
7 programming is preferably delivered from the file server(s) to  
8 the replay unit via an Integrated Service Digital Network (ISDN).  
9 U.S. Patent No. 5,206,859 entitled ISDN MULTIMEDIA COMMUNICATIONS  
10 SYSTEM, incorporated herein by reference, describes such a  
11 system.

12 In accordance with the invention, a variety of means can be  
13 employed to communicate selection instructions to the video  
14 server and to communicate programming material from the server to  
15 the user's display unit. Since the selection instructions are  
16 very compact (i.e., low bandwidth), these instructions can be  
17 communicated via a standard telephone link using an inexpensive,  
18 low speed modem. This is similar, for example, to the method  
19 cable TV viewers use to select pay-per-view programming from  
20 local CATV companies -- i.e., the viewer calls a particular toll-  
21 free number associated with the desired program, and the CATV  
22 office uses a "caller ID" function to determine which customer is  
23 to receive the program.

24 Communication of the programming material from the server to  
25 the display unit may require a higher-bandwidth means. No doubt,



1 certain material -- such as pricing information for a shop-at-  
2 home service or scheduling information for a travel booking  
3 service -- could be easily transmitted via an inexpensive  
4 telephone/modem link. In addition, using the preferred  
5 compression/decompression techniques, many multi-media  
6 applications could also operate over a conventional telephone  
7 link. High quality audio/video programming, however, will likely  
8 require a higher bandwidth transmission medium, such as a CATV  
9 line, microwave link, DSB link, optical fiber link, cellular  
10 radio link, or enhanced bandwidth telephone connection.

11 Although the invention has been described above with  
12 reference to several presently preferred embodiments, such  
13 embodiments are merely exemplary and are not intended to define  
14 the scope of, or exhaustively enumerate the features of, the  
15 present invention. Accordingly, the scope of the invention shall  
16 be defined by the following claims. Where a feature or  
17 limitation of a preferred embodiment is omitted in a claim, it is  
18 the inventors' intent that such claim not be construed to  
19 impliedly require the omitted feature or limitation.